SCHOOL PLANNING

THE ARCHITECTURAL RECORD OF A DECADE

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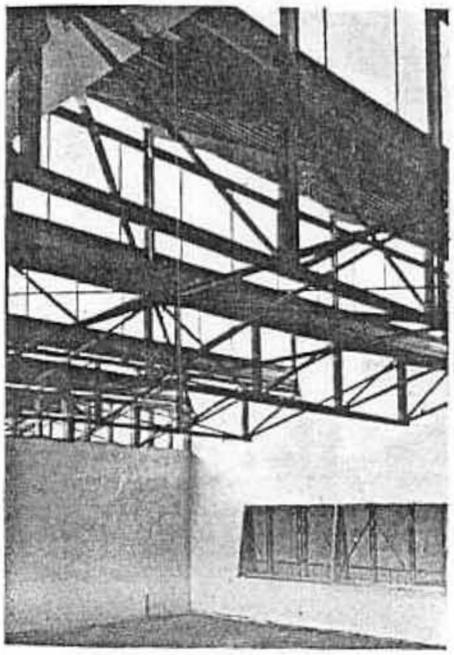
Offsetting of factory-type sawteeth was adopted to provide diaphragm for earthquake bracing

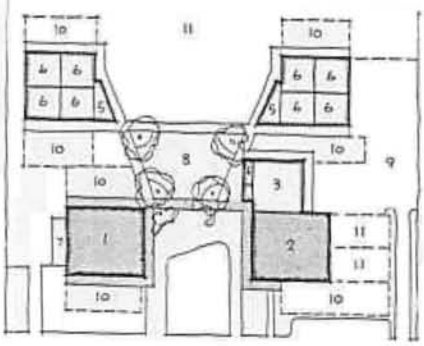


INDUSTRIAL IDEAS CAN RESHAPE SCHOOLS

Two Schools in San Bernardino, California

Jerome Armstrong, Architect; Henry F. Kimes, Superintendent

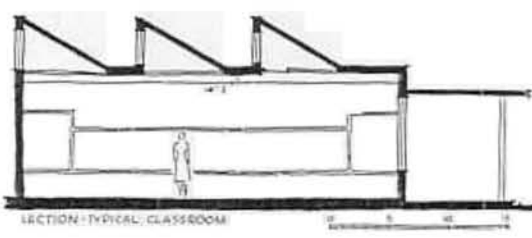
HIGHLY suggestive of the possibilities still ahead of us are these two California schools that adopt industrial sawtooth lighting outright (in addition to side windows for view). An important consequence has been the regrouping of classrooms into blocks of four, each 64 by 64 ft., with consequent sharing of interior partitions, elimination of corridors. (Not even the vaunted "finger plan" is an ultimate.) Construction is of a patented lightweight steel system which eliminates form work. The architect is fully aware that there is room for much further refinement but the top-lighting idea, which is also going forward elsewhere in California, is of high potentiality for the future.

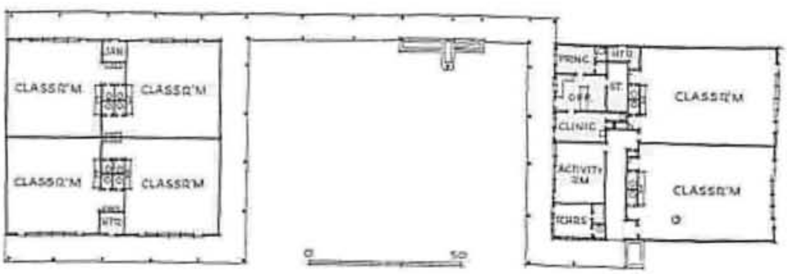


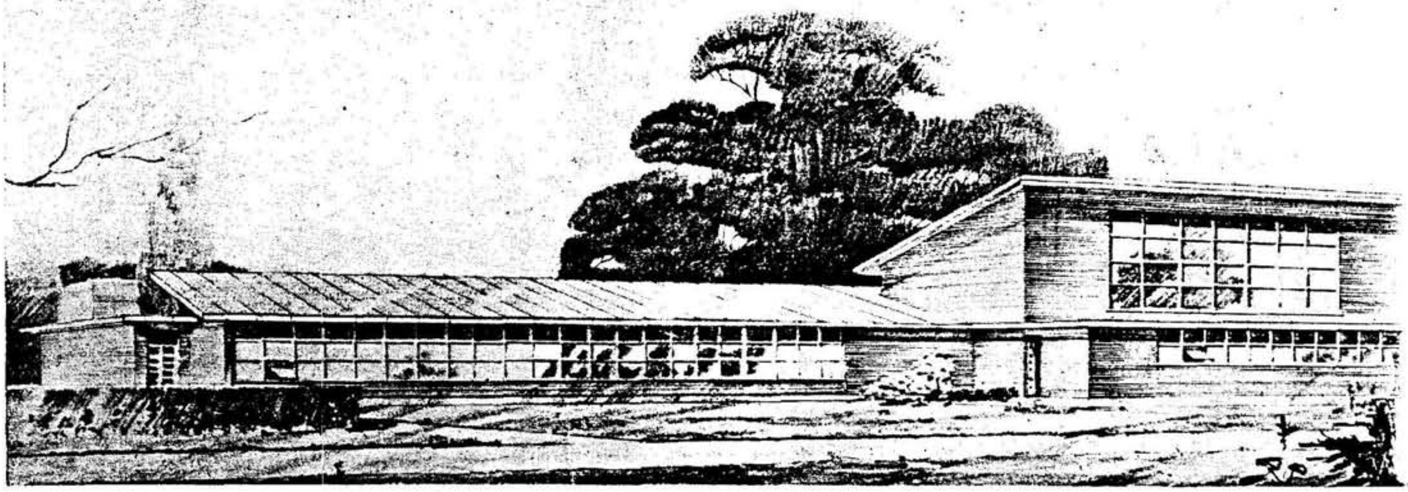
PLOT PLAN LEGEND

- 1 & 2 Units Shown Below
- 3 Multi-Purpose Room
- 4 Kitchen
- 5 Toilet Rooms
- 6 Classrooms
- 7 Bicycle Storage
- 8 Outdoor Eating Area
- 9 Service & Parking
- 10 Outdoor Classrooms
- 11 Playground Area

Drawings are all of the Pacific Avenue School; photographs of the Muscoy School, San Bernardino







lustrations show. Notes on each of these new Michigan school projects are appended to the illustrations.

Possible Drawbacks

1. "What of the cost, compared with a block type of structure?" Probably this conventional type would be the cheaper, *if we used the same construction materials and methods*. In point of fact, the low type of building does not demand the same solidity and fireproofing, because of the far smaller hazard. Codes should be eased to recognize this difference.

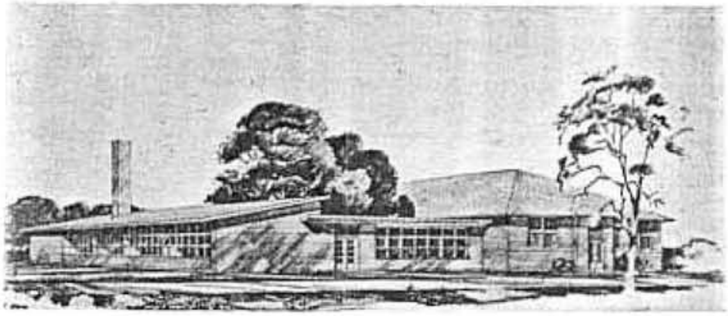
2. Operation and maintenance costs. Greater roof areas mean greater heat loss; also, roofs are the part of the structure that presents maintenance problems. But, again, is this not a matter of sound design in terms of problems to be expected? Certainly we have nothing to boast about in conventional design, where we so often find disintegrating parapet walls, broken flashings, leaking roofs. An architect who practices in the snow country tells me that he believes he can handle snow better with a simple flat-slab roof design than he can with the conventional parapet walls. He is not worried about the gathering of snow in clerestory recesses.

3. "Clerestories will add to heat loss, will leak when ice and snow pile up." There is no doubt of the added heat loss even if glass block are used for insulation. The heating system must be designed in correlation. Certainly a heating system that permits a high heat differential between floor and ceiling is not best. Perhaps radiant heating, of the panel type, is the answer. For years those school-board members who operate industrial plants have been cheerfully using sawtooth roofs, monitor roofs, clerestory sections, skylights; apparently problems of heat loss and leakage have not been insurmountable and, if they exist, have been outweighed by the desire to get some daylight into the buildings so that the workmen might see.

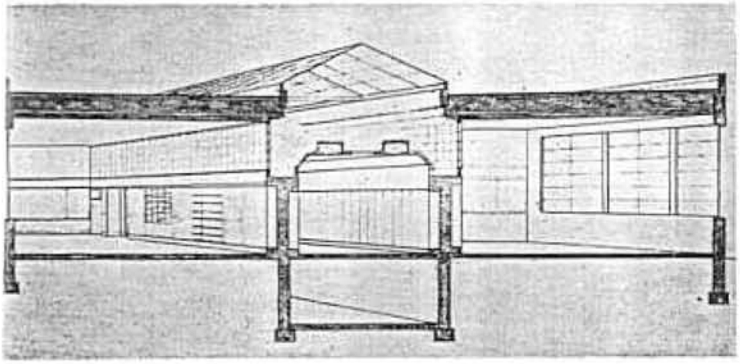
4. "More land area is required by open planning." This is true, of course. The only reply is that there should be careful consideration of values. How important are our children? How important are the safety and educational advantages of the open type of construction weighed against the added land cost? Most school sites are too small anyway, it must be said; and the most efficient paring of land costs can be done by long-term planning and acquisition of sites far in advance of the actual need, rather than by skimping.

5. "Sprawled out buildings are impractical for large schools." This may be a valid objection. If we are to build elementary schools for 1200 to 1500 children and high schools for 3000 to 4000 it does appear somewhat impractical to build them all on one floor. There do seem to be techniques, however, for retaining a good many advantages using two floors with single-loaded corridors. Perhaps, too, these huge schools are so large that they cease at best to be friendly places for children and teachers to work together and become routinized.

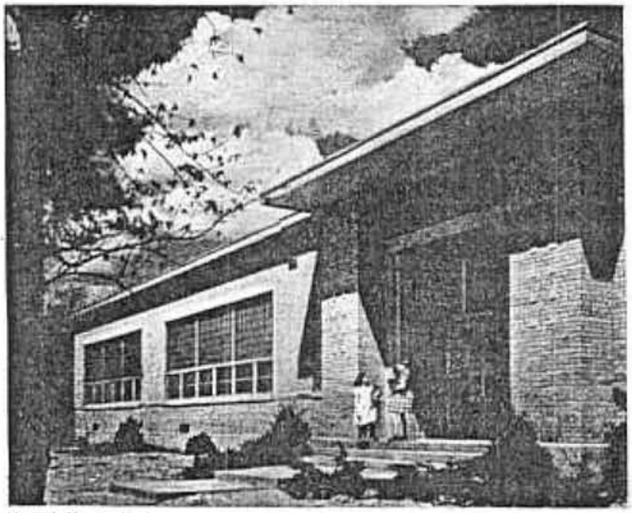
In conclusion, we will get better school buildings in Michigan or anywhere else as we think primarily of objectives to be met, and not of patterns as such, whether old or new. Adaptations of the "California" architecture seem to us to have great possibilities; but fundamentally any locality must develop its own design. Good ideas should be put to use wherever they may be found (and England, Switzerland, or Denmark have their full share of "California" architecture); but fundamentally we must think "from scratch" about what kind of building is needed to meet our own objectives and implement our own educational program. This will bring the only sound design. If architects and administrators can think together more about needs and what they want to do in a building, rather than go about putting up someone else's building, we shall get the kind that makes all the difference.



In both the Sheridan Road elementary school (above) north of Lansing, and the Bullock Creek school at Midland (across-page), architect St. Clair Pardee had the problem of adding rooms to conventional existing schools. In both, bilateral lighting was worked out through a clerestory building section of exceptional design merit. Because of the skill shown in harmonizing the new with the old (without "matching") both schools will be shown more fully later



In his handsomely planned rural community school for Concord, Michigan, architect Carl C. Kressbach has achieved multi-source daylighting in a plan that retains the greater compactness of the central corridor, by skylighting the corridor, dropping its ceiling, putting classroom transom lights above (This interesting trend is apparently widespread — see Ohio and Louisiana examples on later pages of this study)



Hedrich-Blessing Photo

The Oakdale Christian School at Grand Rapids, by Architect James K. Haveman, has directional glass block to carry daylight to interiors of classrooms of accustomed rectangular shape

(panel or other) may offer the best possibilities of satisfactory operation throughout the life of the building.

4. We want buildings designed for instructional utility and interior flexibility. Teachers ask for more space per child, to serve informal activity programs, which go beyond mere sitting, listening, reciting. If space is lengthened at "standard" width, there results an awkwardly long room. Widening instead of lengthening produces a useful squarish shape; this requires either artificial lighting at the inside wall or else *multi-source* daylighting (coming from both sides or in part from above). Even on dark cloudy days there is adequate light outdoors — 300 foot-candles or more. Why not design our buildings to let it in? This is easier in single-story plans.

5. We want buildings adaptable to change. If there is any one thing we know about the educational program, it is that changes are going forward always. Buildings must not prevent them. There must be no trouble about rearranging interior partitions, interior dispositions.

6. We want buildings that can be built in sections, in keeping with limited financial means matched against expanding needs. We need buildings which, although expandable, do not force the continuation of obsolete architecture when additions are eventually built. For some time, respectable school architecture has embodied the principle of expansibility, by means of open-end corridors, sanitary systems, and the like. The trouble is that the addition may not be built for twenty-five years. By that time the world, the educational program, and the architecture have all changed. Rather than let a 25-year-old building dictate the future, why not, even in rigorous climates, sketch out a long-term campus plan with buildings of open type connected by corridors? Each one of these wings or "fingers" can be made self-sufficient in heating and other facilities. Automatic firing burners and gaseous or liquid fuels have removed the indispensability of central heating plants.

In Michigan, as in some other states, there are severe (constitutional) restrictions on the financing of buildings. Bond issues are limited to five years. Such restrictions bring about opportunistic, haphazard building methods in terms of pressing needs, unless a sound long-term program can be developed in advance. The total cost of producing a complete school plant for a long-term plan will far exceed the school district's immediate financing ability. Yet if the long-term plan can be prepared as a series of successive steps, there is the possibility of ultimate coherent realization. It seems to us that the open type of plan lends itself especially well to overcoming such financing restrictions.

As later units are built they are, in most respects, independent buildings. Their architecture can be free of any desire to *match* existing construction and can embody sound later developments in design while still broadly *harmonizing* with the old by virtue of the architect's skill.

The combination of desires expressed in the first part of this article has resulted in the trend which the il-

WHAT WE LIKE ABOUT ONE-STORY SCHOOLS

By Wilfred F. Clapp *Assistant Superintendent School Organization and Plant, Michigan Department of Public Instruction*

At the school seminar of the A.I.A. convention last year at Grand Rapids, the question about California schools was the one most often repeated. Next in frequency came the query, "Why don't the magazines tell us more about daylighting methods and objectives?" Fortunately there were on hand two men pre-eminently

SHOULD "CALIFORNIA" SCHOOLS BE BUILT ELSEWHERE?

in a position to address themselves to both questions — and in relation to one another. Wilfred F. Clapp of the Michigan Department of Public Instruction, and Charles D. Gibson of the California Division of Schoolhouse Construction had just finished a joint tour of Michigan as field representatives of their respective offices, had talked with school architects the length and breadth of the State. (Incidentally, as the frontispiece suggests, the "California" school is really native to countries such as England, Switzerland, Sweden, is an international development not restricted to southern climates.)

Both authors are examples of that rare and slowly multiplying type of state official who takes delight in helping responsible architects to make progress. This school study has turned up enough material for another forthcoming article on "16 More Ways to Daylight a Classroom" by RECORD associate editor Douglas Haskell, in a later issue.

THERE are certain attributes which we very much want in a school building and which we believe can be obtained most easily and economically in the structures that have a resemblance to the so-called "California" type.

1. We want buildings which are friendly to children. We believe that the low-lying, sprawled-out type of building, close to the ground, one story high, straight in its lines, honestly functional, is less awe-inspiring and more friendly in the eyes of the child, though it may not look as grand to adults as some of our multi-storied Roman efforts.

2. We want buildings which are safe. No matter how fire-resistive the materials are, a structure can never be actually fireproof, for the minute we move into it we introduce fire hazards. No matter how well a stairway is designed, vertical travel is more hazardous than horizontal, especially in time of danger. As the earth-bound structure is opened up in plan, a great many more exits can be provided so that the building is evacuated in a flash.

3. We want buildings which are healthful. Health refers to more than sanitation alone. It certainly involves good seeing conditions, good hearing, satisfactory warmth and fresh air.

a. Visual conditions. The more extended discussion of this topic is left to my colleague, Mr. Gibson. Suffice it to say that in single-story open-plan schools good daylighting is comparatively easy to obtain; in multi-story schools it is more difficult.

b. Acoustical conditions. The open plan makes it easier to isolate noise-creating activities such as the shops, gymnasium, band room, orchestra.

c. Heating and Ventilating. In large systems with adequately trained maintenance staffs, the "split" system of heating and ventilating works economically and well. In smaller cities and villages, the more elaborate systems frequently get out of order, are not properly repaired, do not operate satisfactorily. If, as sometimes happens, fan systems are shut off entirely, the high first cost of motors, fans, ducts and controls, is a tremendous waste of funds. Also, successful operation may require that all windows and interior doors be kept closed; this seldom happens in most schools. As plans are opened up, we believe that window ventilation and controlled heat

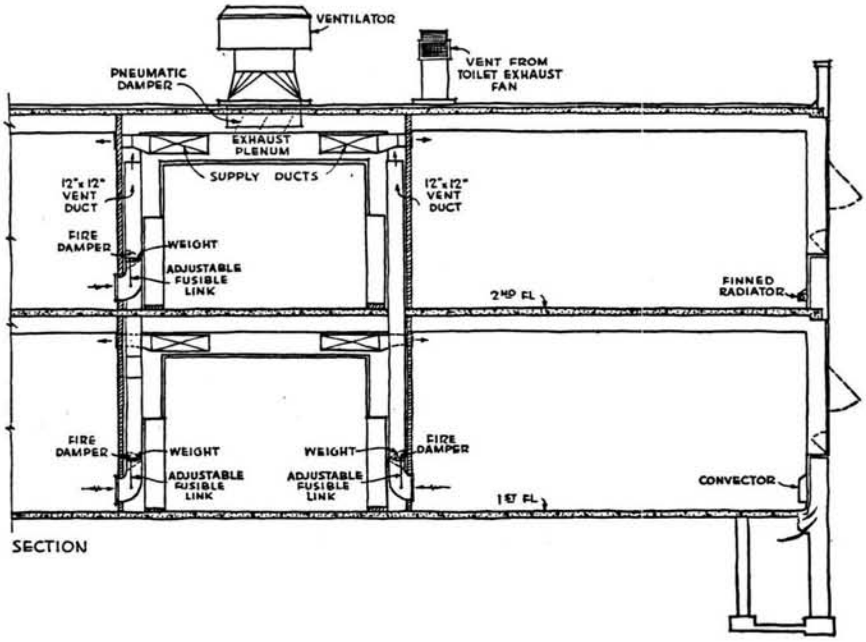
rontispiece by M. Peter Piening

A BALANCED HEATING SYSTEM

Eberle M. Smith Associates

Architects-Engineers

In this school design, uniform heating of classrooms is provided by two kinds of steam radiation, and forced warm air



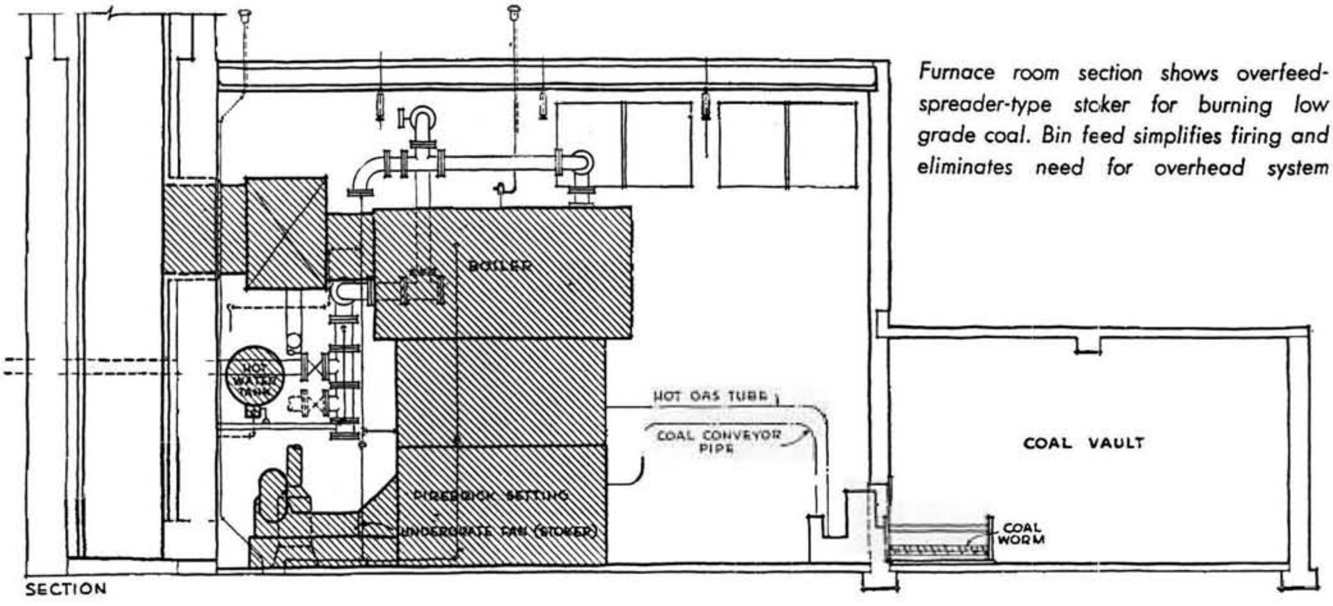
MODIFICATIONS of the conventional school heating system are seen in this design for a large high school near Detroit. For balanced thermal comfort, two kinds of heating are used: (1) a system of steam radiation, and (2) a central fan ventilation system supplying warm air.

As described by Arthur T. Bersey, Mechanical Engineer, the steam radiation is of two types. Second-floor classrooms have finned-tube radiation consisting of steel or copper pipe with fins, similar to heating equipment in railroad cars. Pipe lengths are welded together to form a radiator assembly that runs the approximate length of the room, then mounted on brackets and covered with a metal shield open at top and bottom to permit air circulation. The flow of steam is controlled by a pneumatic valve and a room thermostat.

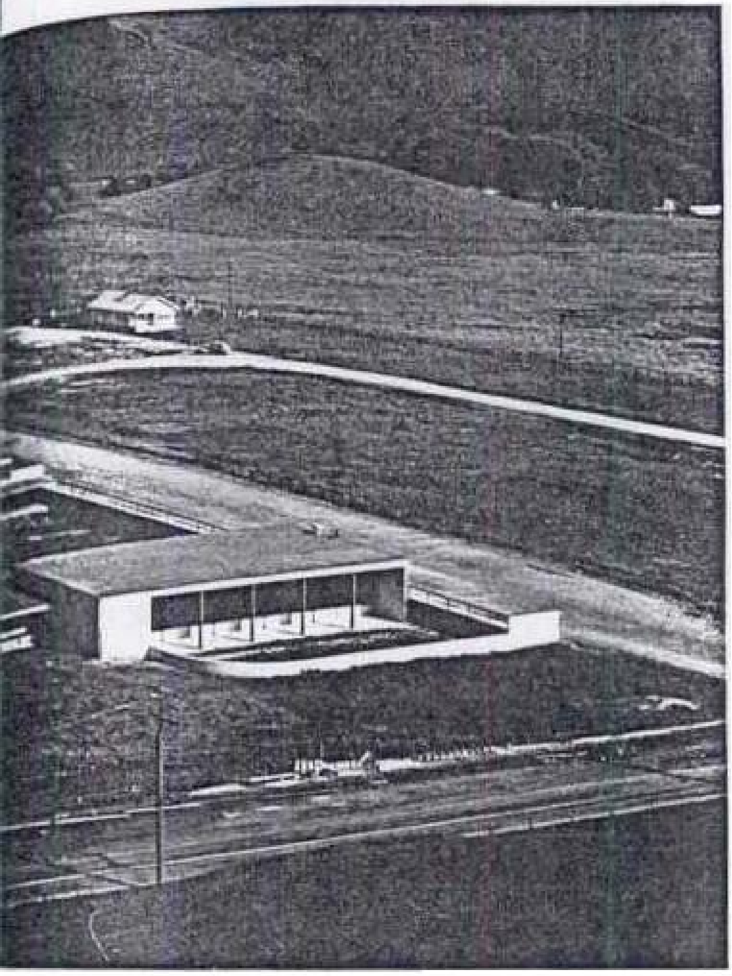
In first-floor classrooms, a standard convector is placed beneath each window. Future additions are planned for the school which will necessitate some changes in classroom layout and the moving of partitions on the first floor. With convector-type radiators, this can be done without altering the heating system except for a slight change in the hookup of the radiator control system.

For ventilation and supplementary heating in the classrooms, forced warm air is introduced from trunk lines above the corridor ceiling. Each classroom, consisting of two bays, has an air intake and an exhaust for each bay, to allow for future changes of partitions and room rearrangement without affecting the air supply.

Furnace room equipment is shown in the sketch below. An overfeed spreader type of stoker permits use of low-grade coal. The bin-feed feature cuts down firing time and labor and also saves the construction cost of the overhead system (overhead bin or charging floor) which is usually required in large schools.

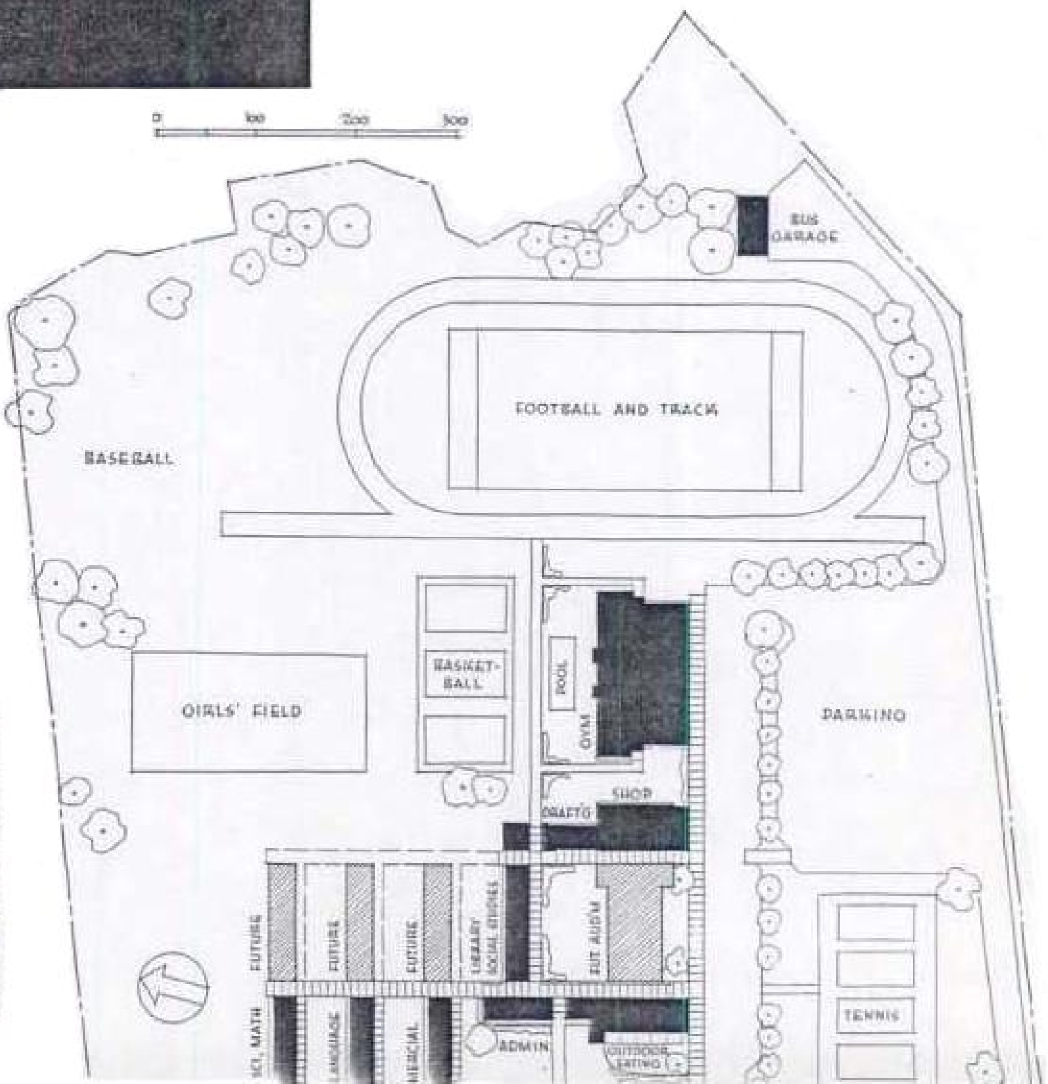


Furnace room section shows overfeed-spreader-type stoker for burning low grade coal. Bin feed simplifies firing and eliminates need for overhead system



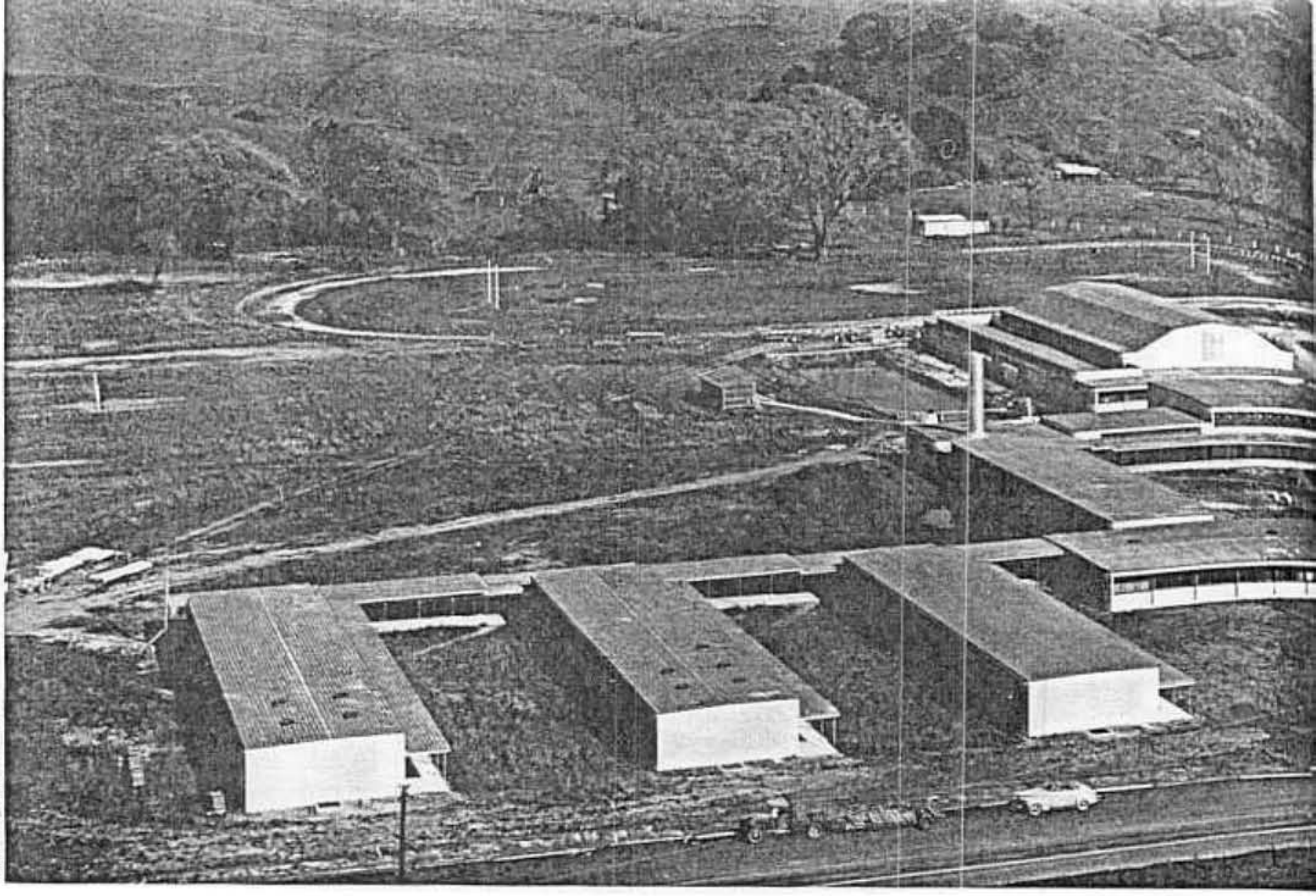
CONSOLIDATED SCHOOLS AND HIGH SCHOOLS

IN 1939 and 1940 ARCHITECTURAL RECORD'S Building Types studies on schools reported numerous changes in school design principles which educators advocated. In teaching practice there has come to be an increasing emphasis upon laboratory methods, in even the most static subjects; and the pupil's school life is being integrated with the community—and vice versa. Also, the past few years have introduced a need for structural economy, and it has been recognized in many parts of the country that requirements change so rapidly that the plan must be flexible, the entire plant dynamically useful.



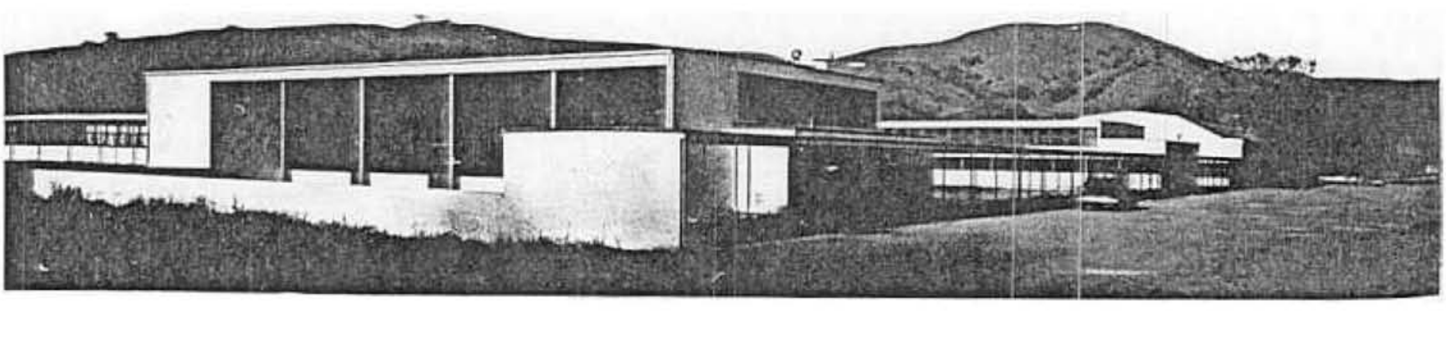
PLOT PLAN: There is no monumental main entrance: instead, a 500-ft. open corridor on the south gives access to classroom wings, cafeteria, shop and gymnasium. More than 9 school buses (present requirements) discharge pupils at loading dock. Areas cross-hatched indicate future expansion. Open plan permits proper orientation and functional relationships for study, work and play, and minimizes the noise nuisance.

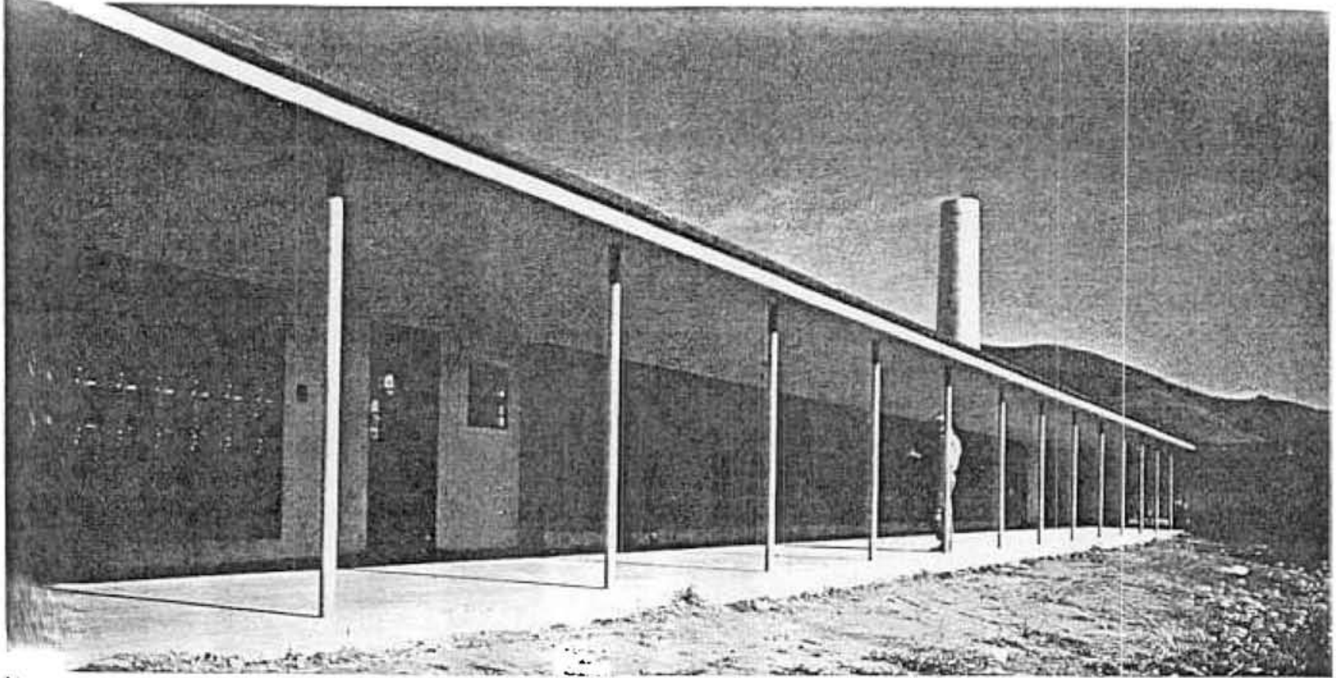
Photos by Esther Born



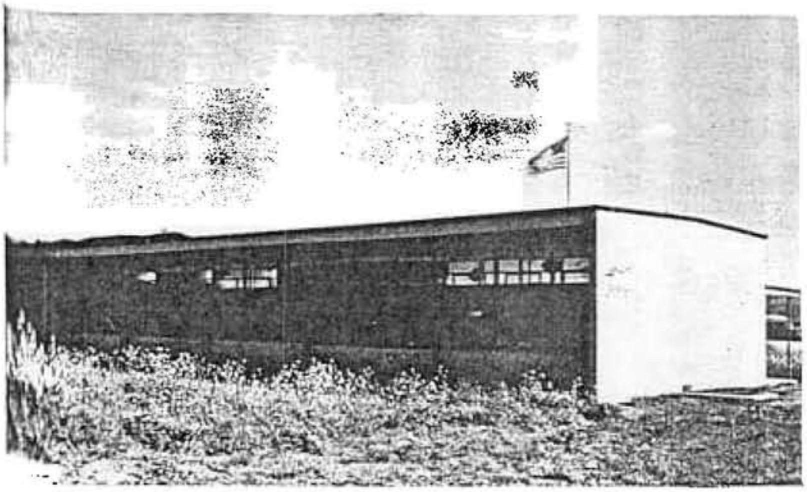
ADVANCED CALIFORNIA SCHOOL MEETS LIMITED BUDGET

ACALANES UNION HIGH SCHOOL, LAFAYETTE, CALIFORNIA. FRANKLIN & KUMP, ARCHITECTS. In the Acalanes School most of the advanced principles of school design have been successfully applied. The problem presented was difficult. First, access to the school is entirely vehicular. Second, the budget was extremely limited yet the school district wanted completely modern, even advanced, design and equipment. Third, California curricula are never static. Classrooms, activity spaces, administrative offices, etc., must be highly flexible or they suffer early obsolescence. There had to be space for additional classroom units and a future auditorium. Fourth, there had to be provision for intensive adult use of classrooms, assembly spaces and athletic facilities. Elements most likely to be used by adults during school sessions had to be segregated. Large parking areas had to be convenient to all athletic facilities. Fifth, in addition to high State standards, the building had to be made earthquake-resistant. Sixth, soil conditions offered structural difficulties.

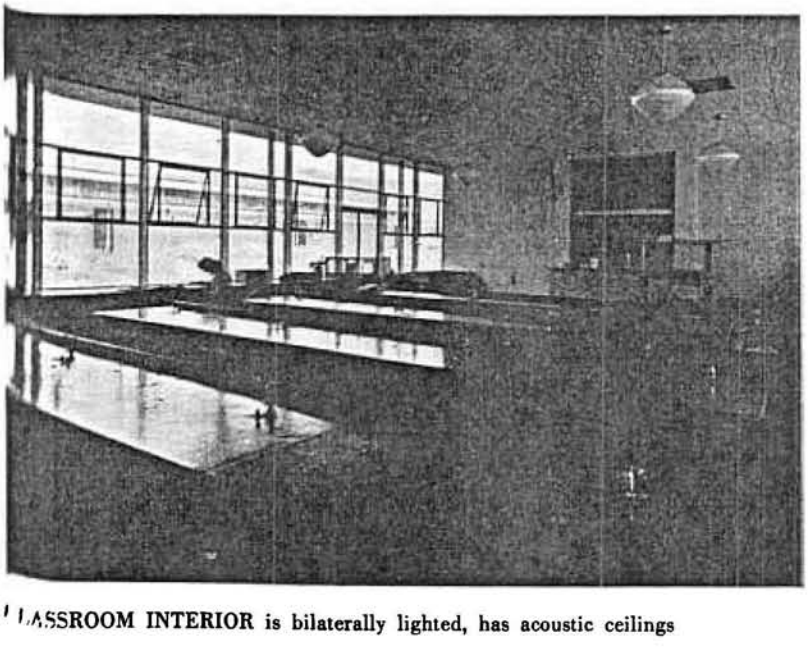




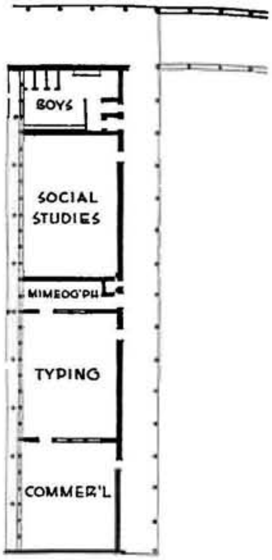
OUTSIDE CORRIDOR leads to classroom units; sub-corridors to each wing



EXTERIOR of class unit: At left is a vertical I-beam, part of earthquake bracing



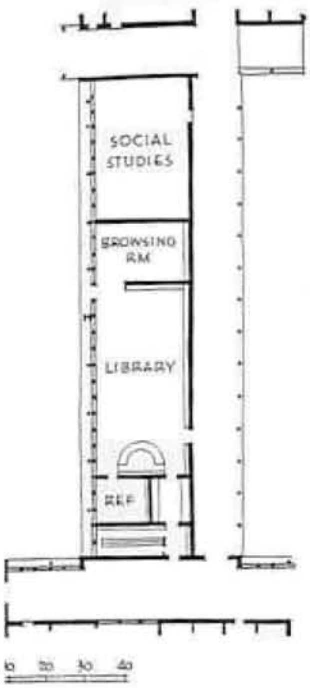
CLASSROOM INTERIOR is bilaterally lighted, has acoustic ceilings

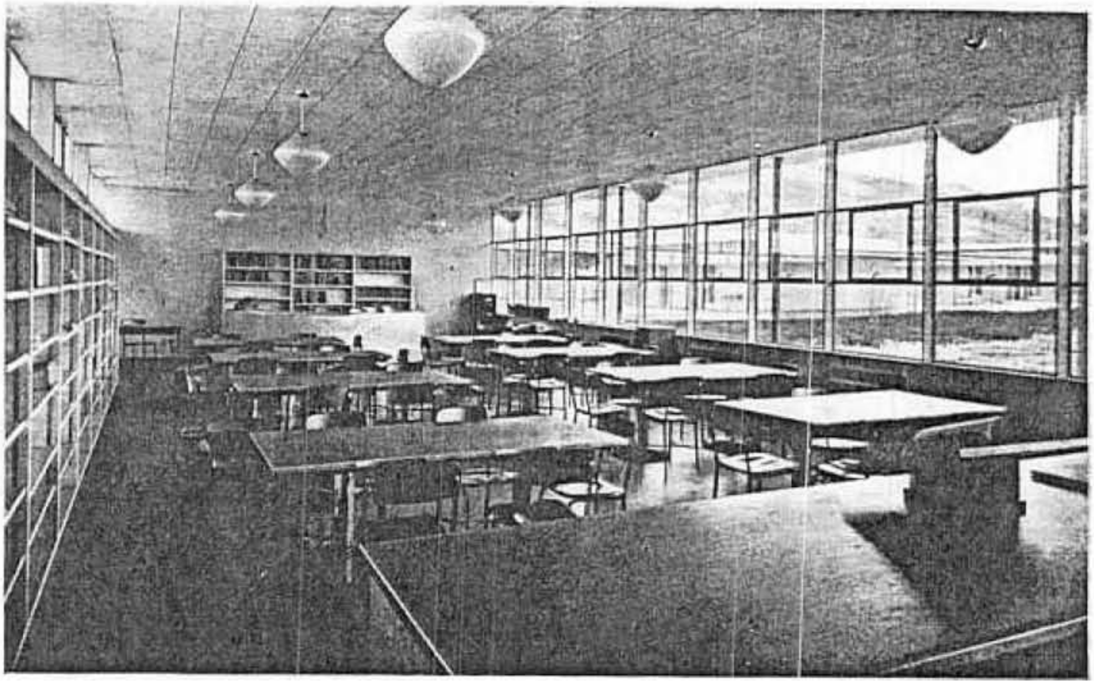


CLASSROOM WING

PARTLY BECAUSE the method of seismic bracing demanded, and partly because greater flexibility of plan was thereby achieved, each classroom wing is an open loft space. Dividing partitions of plywood were added later and can be relocated. Both removable acoustic ceiling tile and linoleum floor are continuous over and under partitions. Copper convector radiators have individual thermostatic controls to permit any possible arrangement of partitions without unbalancing system. Mechanical lines under floors are readily accessible for changes or repairs. With bilateral lighting satisfactory workrooms and offices can be located on the corridor wall, an even high intensity of light covers the entire classroom, and the resulting low ceilings in turn lower the plane of artificial light in relation to working planes.

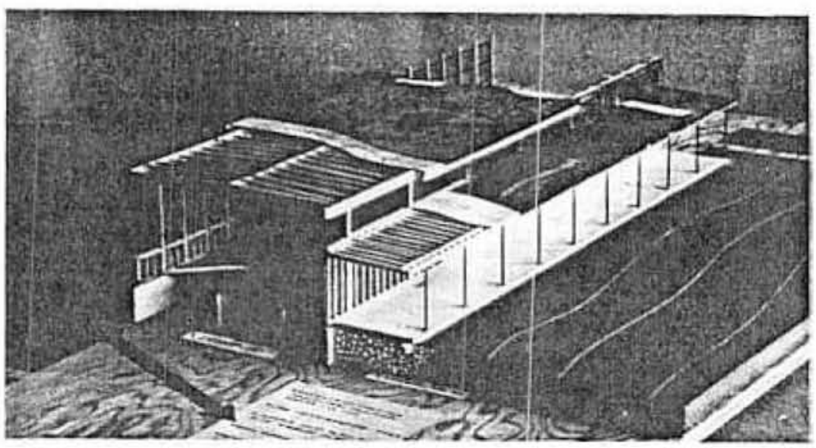
LIBRARY WING



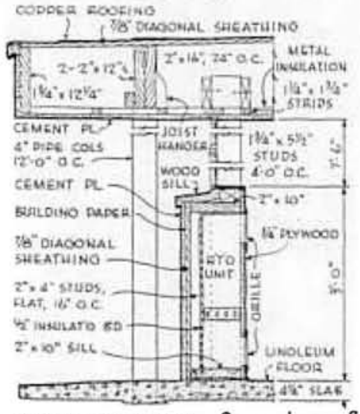


IN THE LIBRARY, as in other units, low ceilings and a close relation between outdoors and indoors make the scale of the building intimate and human. The use of natural materials and warm colors increases this effect. All ceilings are insulated and heat-reducing glass is used to keep room temperatures comfortable in hot weather

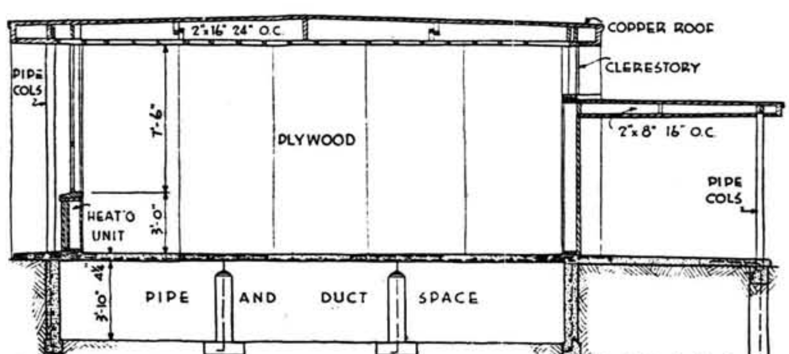
CONSTRUCTION is standardized on a 4-ft module, used throughout the plant. This simplifies sash sizes, permits use of standard 4-ft. plywood panels and 16-in. ceiling tiles, also construction economies. Along north walls of class and study units are continuous windows 7 ft. 6 in. high. Over the unit corridors are clerestories with glare-reducing, heat-reducing glass. 10 ft. 6 in. ceilings reduce building volume and heating expense. In excavating, an objectionable adobe stratum was removed and the space beneath units was left open for supply lines. Framing for concrete floor forms was reused for wall studding. Roof is copper; exterior wall, wood frame and stucco; interior finish, natural plywood. Total cost including site, fees, furnishings —$330,000; cost per sq. ft., $3.67. These low figures reduce interest on school bonds and lower insurance costs.



MODEL was built for study and for client's information



OUTSIDE WALL SECTION



TYPICAL CLASS ROOM SECTION